Silane Oligomer Analysis with Agilent OligoPore and Gel Permeation Chromatography

Application Note

Materials Testing and Research

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Introduction

Alkyl silanes are a class of reactive molecules that can be hydrolyzed and polymerized by condensation reactions to form oligomeric and polymeric materials, including silica glasses and gels. This application note illustrates the use of Agilent OligoPore columns and gel permeation chromatography for the analysis of silane oligomers generated by the controlled hydrolysis of silanes under acidic conditions.

Silane Olgomer Analysis

Dimethyldiethyl (DMDE) silane was mixed with a 0.1 N hydrochloric acid solution in 50:50 ratio and left to react for 12 hours. After the reaction period, the sample was made up at 0.2% (w/v based on the silane) in tetrahydrofuran and injected without further treatment. Figure 1 is the resulting chromatogram of dimethyldiethyl silane after the hydrolysis reactions.

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Conditions

Samples	Hydrolyzed dimethyldiethyl silane (DMDES), 0.2% (w/v)
Columns	2 × Agilent OligoPore, 7.5 × 300 mm (p/n PL1113-6520)
Eluent	THF
Flow rate	1.0 mL/min
Inj vol	100 µL
Detector	RI
System	Agilent PL-GPC 50

Conclusions

Agilent OligoPore columns resolve the individual low molecular weight DMDE silane oligomers after hydrolysis. Individual oligomers can be identified allowing a fingerprint of the silane oligomer distribution after hydrolysis for different times and under different conditions, a vital tool for quality and process control.

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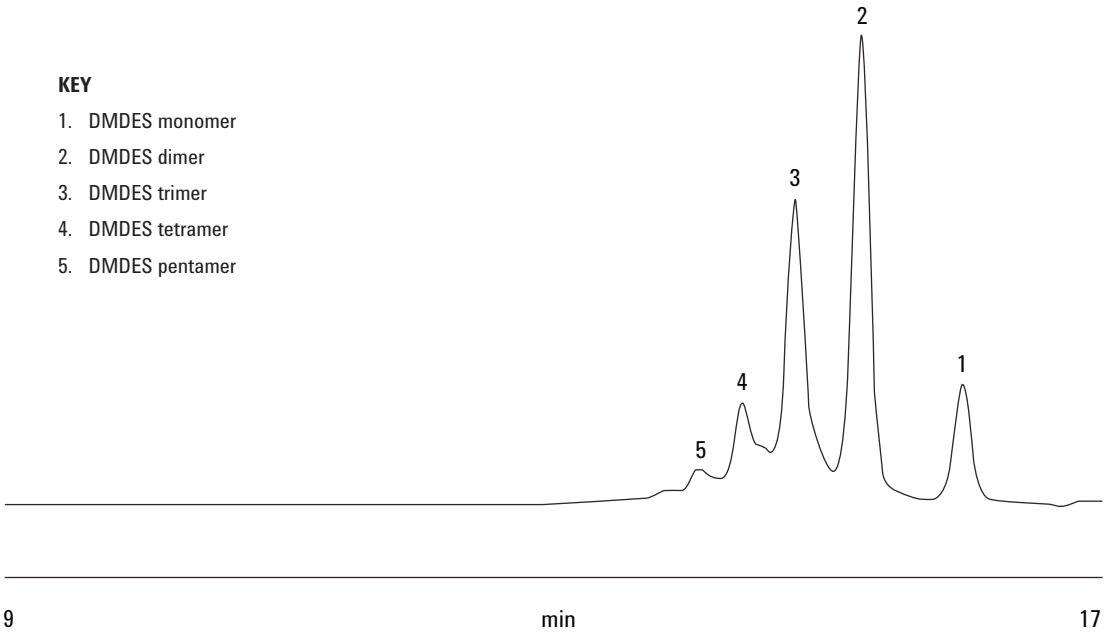

Figure 1. Fingerprinting silane oligomers with an Agilent OlgioPore column.

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